

What Is Claimed Is:

1. A method for searching multipaths of a mobile communication system, the method comprising the steps of:

performing a coherent detection on a reversed I and Q channel signals of a
5 DPCCH transmitted from a mobile station, multiplying the detected signal by a pilot
pattern to accumulate a pilot symbol section in a corresponding section, and performing
a coherent accumulation on the other symbol section in a symbol basis;

calculating energy value for each coherently accumulated I and Q channel
signals;

10 multiplying the calculated energy values by a weight that has been multiplied
by the pilot symbol section and another weight that has been multiplied by the other
symbol section, respectively;

noncoherently accumulating the energy values multiplied by variable weights,
and saving the energy values; comparing the saved energy values with a periodically
15 designated threshold; and

searching timing information as many as a number of fingers in order of highest
energy value according to the comparison result.

2. The method of claim 1, wherein a total energy is searched by accumulating
20 the pilot symbol section of the DPCCH to the pilot symbol, by coherently accumulating
the other control symbol section in a symbol unit, and by multiplying each accumulated
symbol section by different weights from each other.

3. The method of claim 1, wherein a number of the pilot symbols of the
25 DPCCH is multiplied by a first weight corresponding to the pilot symbol section in a

variable section, and by a second weight corresponding to the other symbol section.

4. The method of claim 2, wherein the number of the pilot symbols of the DPCCH is variable, being arbitrarily selected from 3 through 8.

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5. The method of claim 2, wherein the weight corresponding to a specific pilot symbol section is P_n over $\{P_n + 1\}$, and the weight corresponding to the other symbol section is 1 over $\{P_n + 1\}$, in which P_n is the number of the specific pilot symbols of the DPCCH.

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6. The method of claim 2, wherein the first weight to be multiplied by the pilot section of the DPCCH, and the second weight to be multiplied by the other symbol section complement each other, and the sum of the two weights is 1.

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7. The method of claim 1, wherein the method is repeated as many times as a designated hypothesis of a window size for multiplication the number of the pilot symbols of the DPCCH and the other control symbols by variable weights, noncoherent accumulation, and storage in a search result storage.

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8. An apparatus for searching multipaths of a mobile communication system, comprising:

a decimator for performing a decimation process on each channel signal inputted in a predetermined sample at a designated rate;

an input buffer for saving every output of the decimator;

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a complex despreader for despreading the outputs from the input buffer into

complex signals using a scrambling code signal generated by a scramble control signal;

a coherent accumulator for coherently accumulating a multiplication of the despread output and a pilot signal on a basis of a pilot symbol section and the other control symbol section;

5 an energy calculator for calculating an energy value of a Dedicated Physical Control Channel (DPCCH) using the coherent accumulation signal;

a multiplier for multiplying the pilot section of the DPCCH and the other control symbol section by an appropriate weight, respectively;

10 a noncoherent accumulator for noncoherently accumulating an output of the multiplier;

a search result storage for sequentially storing output of the noncoherent accumulator in a form of a search energy value; and

a digital signal processor for outputting a control signal to generate the scrambling code, for outputting different weights according to a pilot symbol of the DPCCH, and for periodically storing the search energy value in the search result storage.
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9. The apparatus of claim 8, wherein the coherent accumulator accumulates the pilot symbol section of the DPCCH to the pilot symbol, and coherently accumulates the other control symbol section except for the pilot symbol in a symbol unit.

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10. The apparatus of claim 8, wherein a number of the pilot symbols of the DPCCH is variable, being arbitrarily selected from 3 through 8.

11. The apparatus of claim 8, wherein the multiplier multiplies the pilot symbol section in a variable section of the number of pilot symbols of the DPCCH by a
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first weight transmitted from the digital signal processor, and the other symbol section by a second weight transmitted from the digital signal processor.

12. The apparatus of claim 8, wherein the weight corresponding to a specific pilot symbol section is P_n over $\{P_n + 1\}$, and the weight corresponding to the other symbol section is 1 over $\{P_n + 1\}$, in which P_n is the number of the specific pilot symbols of the DPCCH.

13. The apparatus of claim 8, wherein the multiplier multiplies the pilot section of the DPCCH by a first weight, and the other symbol section by a second weight, the two weights being complemented each other and the sum of the two weights being 1.

14. A method for searching multipaths of a mobile communication system, the method comprising the steps of:

decimating despread I and Q channel signals of a Dedicated Physical Channel (DPCH) transmitted from a mobile station, storing the decimated I and Q channel signals in an input buffer, respectively, and despreading the channel signals to a scrambling code signals;

calculating an energy value of a Dedicated Physical Data Channel (DPDCH) by multiplying the despread channel signals by a pilot pattern, coherently accumulating the multiplication outputs, calculating an energy value of the Dedicated Physical Control Channel (DPCCH), dechannelizing the despread channel signal to an orthogonal variable spreading factor (OVSF), and coherently accumulating the dechannelized code;

noncoherently accumulating the energy values of the DPCCH and the DPDCH,

and multiplying each channel energy value by different channel weights according to a spreading factor of the DPDCH;

adding the channel search energy values multiplied by different channel weights together, sequentially storing the sum, and periodically comparing the stored channel search energy values with a designated threshold; and

sending out the channel energy value greater than the threshold to a sort block, and searching timing information in order of high to low energy value as many as fingers.

10 15. The method of claim 14, wherein the channel weight comprises a first channel weight corresponding to a spreading factor of the DPDCH of the DPCCCH that is noncoherently accumulated, and a second channel weight corresponding to a spreading factor of the DPDCH of the DPDCH that is noncoherently accumulated.

15 16. The method of claim 15, wherein if the spreading factor (SF_k) of the DPDCH varies from 4 through 256, and satisfies $256 \text{ over } 2^k$ ($k=0\sim6$), the first channel weight (W_c) corresponding to the spreading factor (SF_k) of the DPDCH is any value satisfying a formula, $\{1\} \text{ over } [\{256 \text{ over } SF_k\} + 1]$, and a second channel weight (W_d) is any value satisfying a formula, $\{256 \text{ over } SF_k\} \text{ over } [\{256 \text{ over } SF_k\} + 1]$.

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17. The method of claim 15, wherein the first weight to be multiplied by the spreading factor of the DPDCH, and the second weight to be multiplied by the energy of the DPDCH complement each other, and the sum of the two weights is 1.

25 18. An apparatus for searching multipaths of a mobile communication system,

comprising:

a decimator for receiving a Dedicated Physical Channel (DPCH) signal from a mobile station, for filtering off the signal, and decimating I and Q channel signals at a designated ratio, the signals being inputted in a form of a designated sample;

5 an input buffer for storing output of the decimator;

a complex despreader for despreading the channel signal saved in the input buffer to a scrambling code signal under the direction of a scrambling code signal generated by a scrambling code control signal;

a first channel energy searcher for searching a first channel (DPCCCH) energy by
10 multiplying the despread output by a pilot signal and coherently accumulating the multiplication output;

a second channel energy searcher for searching a second channel (DPDCH) energy by dechannelizing output of the complex despreader to an orthogonal variable spreading factor (OVSF), by coherently accumulating the output to calculate the energy,
15 and by noncoherently accumulating the calculated energy;

a first multiplier for multiplying the output of the noncoherent accumulation of the first channel energy searcher by a first channel weight;

a second multiplier for multiplying the noncoherently accumulated first channel energy of the second channel energy searcher by a second channel weight

20 an adder for adding up the output of the first multiplier and the output of the second multiplier;

a search result storage for storing a total value of the adder; and

a digital signal processor for outputting different channel weight according to each unit's control and a spreading factor of the DPDCH, for periodically storing the
25 search energy values saved in the search result storage; for comparing the stored search

value with a threshold, and if the search energy value is greater than the threshold, searching for timing information in order of high to low energy value as many as fingers.

19. The apparatus of claim 18, wherein the first channel energy searcher
5 comprises:

a first and a second coherent accumulator;

a first energy calculator for calculating an energy value of the DPCCH based on
a coherently accumulated signal by the first and the second coherent accumulators; and

a first noncoherent accumulator for noncoherently accumulating the output of
10 the energy calculator.

20. The apparatus of claim 18, wherein the second channel energy searcher
comprises:

a third and a fourth multipliers for dechannelizing the despread signals by the
15 complex despreader by multiplying the signal by the OVSF code to distinguish the
channel;

a third and a fourth coherent accumulators for coherently accumulating output
of the third and the fourth multipliers, respectively;

a second energy calculator for calculating a energy value of the DPDCH out of
20 the coherent accumulation signal; and

a fourth noncoherent accumulator for noncoherently accumulating output of the
second energy calculator.

21. The apparatus of claim 18, wherein the digital signal processor has a first
25 channel weight and a second channel weight according to a spreading factor of a reverse

DPDCH, the two weights being complement each other and sum of the two being 1, and outputs the weights to a first multiplier and a second multiplier, respectively.

22. The apparatus of claim 21, wherein if the spreading factor (SF_k) of the digital signal processor varies from 4 through 256, and satisfies $256 \text{ over } 2^k$ ($k=0\sim6$), and outputs the first channel weight (W_c) corresponding to the spreading factor (SF_k) of the DPDCH as $\{256 \text{ over } SF_k\} \text{ over } [\{256 \text{ over } SF_k\} + 1]$, and the second channel weight (W_d) as $\{1\} \text{ over } [\{256 \text{ over } SF_k\} + 1]$,

23. A method for searching multipaths of a mobile communication station, wherein a base station searches the multipaths optionally selecting one of the steps of:

a1) searching multipaths of the mobile station by providing different weights to a pilot symbol section of a Dedicated Physical Control Channel (DPCCH) and the other control symbol section, respectively in case that a spreading factor of a reverse Dedicated Physical Data Channel (DPDCH) transmitted from a mobile station is not known ; or

b1) searching multipaths of the mobile station by multiplying an energy value of the DPCCH and an energy value of the DPDCH by different weights that correspond to the spread factor of the DPDCH, respectively, thereby obtaining a total energy in case that the spreading factor of the reverse Dedicated Physical Data Channel (DPDCH) transmitted from a mobile station is known .